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- (21) Application No. 42014/77 (22) Filed 10 Oct. 1977
 (31) Convention Application No. 763 439 (32) Filed 8 Oct. 1976 in
 (33) Norway (NO)
 (44) Complete Specification published 8 May 1980
 (51) INT. CL.⁴ B01F 3/08 //
 A01G 9/24
 B01F 15/02 15/04
 (52) Index at acceptance
 A1D 3B4
 A1E 4



(54) APPARATUS FOR MIXING WATER AND FERTILIZER FOR USE IN THE AUTOMATIC IRRIGATION AND FERTILIZATION OF PLANTS

- (71) We, DAMENG A/S, a Norwegian body corporate, of Spro, Norway, do hereby declare the invention, for which we pray that a patent may be granted to us, to be particularly described in and by the following statement:—
- The present invention relates to an apparatus for mixing water and fertilizer for use in the automatic irrigation and fertilization of plants, e.g. in a greenhouse, especially a small domestic greenhouse.
- Various such mixing apparatuses or devices are known, where dosed amounts of fertilizers are added to the water. The most simple device, where water is taken from the water main, has the disadvantage that the concentration of fertilizer in the water will vary very much due to the unavoidable variations of pressure in the water main.
- Thus, a higher pressure will result in an increased water supply, and when a fertilizer is added to the water in equal time unit doses, the mixture will become weaker than intended, whereas it will become too strong for the plants when the pressure is reduced.
- There also exist complicated electronic irrigation plants where fertilizers are added and the temperature and humidity are measured and the irrigation as well as the addition of fertilizers is accurately adjusted. Equipment of this kind is, however, much too expensive for use on a smaller scale and is intended for large market or nursery gardens and for large scale cultivation of plants.
- The present invention seeks to provide in a preferred embodiment an apparatus for automatic irrigation and fertilization of plants which has none of the above mentioned disadvantages.
- According to one aspect of the present invention, there is provided an apparatus for mixing water and fertilizer for use in the automatic irrigation fertilization of plants, comprising a container in which water and fertilizer are to be mixed in predetermined proportions, means for discharging the mixture for said use; conveying means operable in response to the movement of a float to transmit a predetermined amount of fertilizer to the water when a predetermined level of water has been reached in the container; an open-topped receptacle for fertilizer connected with said conveying means and a pressure balancing chamber comprising inlet means for water and outlet means to said container, wherein the float is secured to one end of a first arm the other end of which first arm is secured to a second arm which carries the conveying means, one of said arms being pivoted at a point which is fixed relative to the container, the second arm being arranged so as to be capable of extending into the open topped receptacle, wherein the float in the container is connected with the conveying means and wherein when said float is above the water level in the container the conveying means is at or adjacent to the bottom of the receptacle and when the water level in the container rises the float also rises so that the conveying means is moved out of the open-topped receptacle and transmits the predetermined amount of the fertilizer to the water in the container.
- With an apparatus according to the preceding paragraph correct dosing of fertilizers for an allotted amount of water may be achieved, without any adverse influence due to variations of water pressure. Also, the apparatus may be made simple and inexpensive and thus suitable for private usage without being limited to such private usage. Larger units than those used for private usage or a plurality of component units in parallel are suitable for growing plants on a large scale.
- An embodiment of the invention will now be described by way of example with reference to the drawing, the sole figure of which shows in vertical section an apparatus for

mixing water and fertilizer for use in the automatic irrigation and fertilization of plants.

The apparatus comprises a casing 1 that is divided into an upper container 2 and a lower container 3. The top container 2 is supplied with water at 4, e.g. from a hydraulic main, where the pressure can vary considerably. The flow of water to container 2 is adjusted by a float valve 5 and the water in container 2 flows through a pipe 6 to lower container 3 which is gradually filled to a level 7. The flow through pipe 6 is controlled by a valve 8, e.g. by the aid of a control knob 9 outside casing 1. When the water in lower container 3 has reached said level 7 a siphon 10 will be filled and activated, so that water from the container 3 can flow out through a line 11 to irrigation locations through suitable nozzles near the plant.

Above the water level 7 in container 3 there is a container 12 containing a liquid fertilizer. The container 12 may e.g. be filled from outside the casing 1 as indicated by arrow 13. In the container 12 a ladle 14 in the form of a shallow tray or bowl having an appropriate volume for the amount of water in container 3 is provided. The ladle 14 is secured to an arm 15 which is pivotally mounted at 16 to a point which is fixed relative to the container 3. The arm 15 is connected to a float 17, which is raised after the water level in container 3 has risen above the dotted line 18. As the water rises gradually above level 18 and approaches level 7 the float 17 will rotate the arm 15 and ladle 14 about pivot point 16 to the position indicated by dotted lines. In that position the amount of fertilizer provided in ladle 14 will have been lifted above container 12 and transmitted to the water in the container 3. The arm 15 is advantageously shaped as a pipe through which the liquid fertilizer from ladle 14 will flow when the arm 15 and the ladle 14 are in their raised positions. The liquid fertilizer will then be discharged through a lower end 19 of the pipe 15. Immediately after the liquid fertilizer has been transmitted from the ladle 14 the water in container 3 will reach level 7 and the siphon will be activated as mentioned above. The mixture of water and fertilizer will then flow out to the plants through the pipe line 11 and this flow is more rapid than the continued supply of water through pipe line 6, so that the level of the mixture in container 3 will sink rapidly and the container 3 is emptied, whereafter the siphon effect ends. When the water level has receded below the dotted line 18 in the container 3 the ladle 14 will have returned into the liquid fertilizer in container 12 and when the siphon effect ends the container 3 is again filled with water.

Eventually the ladle 14 is raised again from the container 12 to discharge the allotted amount of fertilizer so that another portion of water-fertilizer mixture is formed and can flow to the plants. In this manner a periodical discharge of the water-fertilizer mixture is achieved. The discharge cycle of the water-fertilizer mixture will always be correct, whether the apparatus is filled and emptied rapidly, e.g. for a large number of plants, so slowly for a smaller number of plants.

The disclosed embodiment is only meant as an illustration of the invention and does in no way limit the scope of protection, other embodiments being feasible within the scope of the appended claims. For example, the transmission of fertilizer from the ladle 14 to the container 3 may be achieved by other means than through a pipe, provided that the ladle movement is controlled by the water level in the container and that the transmission of fertilizer occurs when the container contains a predetermined amount of water.

WHAT WE CLAIM IS:—

1. Apparatus for mixing water and fertilizer for use in the automatic irrigation and fertilization of plants comprising a container in which water and fertilizer are to be mixed in predetermined proportions, means for discharging the mixture for said use; conveying means operable in response to the movement of a float to transmit a predetermined amount of fertilizer to the water when a predetermined level of water has been reached in the container; an open-topped receptacle for fertilizer connected with said conveying means and a pressure balancing chamber comprising inlet means for water and outlet means to said container, wherein the float is secured to one end of a first arm the other end of which first arm is secured to a second arm which carries the conveying means, one of said arms being pivoted at a point which is fixed relative to the container, the second arm being arranged so as to be capable of extending into the open topped receptacle, wherein the float in the container is connected with the conveying means and wherein when said float is above the water level in the container the conveying means is at or adjacent to the bottom of the receptacle and when the water level in the container rises the float also rises so that the conveying means is moved out of the open-topped receptacle and transmits the predetermined amount of the fertilizer to the water in the container.

2. Apparatus as claimed in Claim 1, wherein the second arm comprises a pipe having an intake near the conveying means and a discharge opening at its other end.

3. Apparatus as claimed in Claim 1 or Claim 2, wherein the conveying means com-

prises a shallow tray or bowl.

4. An apparatus as claimed in any preceding Claim, comprising means for adjusting the flow of water through the outlet 5 means from the pressure balancing chamber to the container.

5. An apparatus as claimed in any preceding Claim, wherein the discharging means comprises a siphon arrangement.

10 6. An apparatus for mixing water and fertilizer for use in the automatic irrigation and fertilization of plants, substantially as

herein described with reference to and as shown in the accompanying drawings.

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Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd., Berwick-upon-Tweed, 1980
Published at the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained

COMPLI SPECIFICATION

This drawing is a reproduction of
the Original on a reduced scale

